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This is the first in a series of six annotated bibliographies. It has as its general subject the physical aspects of early childhood education and includes three subdivisions: genetics, sensory-motor processes, and growth. Each of the 15 abstracts included has been classified by general and specific subject, by focus of study, and alphabetically by author. Focus of study categories are normative, environmental, measurement and techniques, intervention, pathology, physiology, animals, and general. Studies are described in terms of problem or purpose, method, and findings. The general subjects of other bibliographies in the series are language, education, cognition, personality, and social aspects of early childhood education. (MS)

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1968

This bibliography is Number 1 in a series of six. The general subject is Physical, and it is divided into the following specific subjects:

1. Genetics
2. Sensory-Motor Processes
3. Growth

The five other bibliographies (Number 2 through Number 6) will contain the following general subjects:

2. Language
3. Education
4. Cognition
5. Social
6. Personality

Every abstract in this series has been coded at four levels; namely, general subject, specific subject, focus of study, and alphabetical by author. In all six bibliographies, the categories under focus of study have been coded as follows:

1. Normative
2. Environmental
3. Measurement and Techniques
4. Intervention
5. Pathology
6. Physiology, Etc.
7. Animals
8. General

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1.1
GENETICS

1.1.1 NORMATIVE

1.1.1.1 Heath, H. M. Three 4-year-olds. Child Development, 1963, 34, 719-732.

Purpose: This is a longitudinal study of a set of triplets for the first four years of life. Two of them are identical, the third, fraternal, which presents a unique opportunity to investigate the effects of heredity and environment. The author's chief interest is in the development of personality.
Method: Subjects--Tom, Dick, Harry. Dick and Harry are identical. Tom is fraternal.
Procedures: Interviews with parents, informal observations, tests: Gesell Developmental Schedules, Vineland Maturity Scale, Stanford-Binet, Merrill-Palmer, Rorscharch.
Research design: Information for first 16 months comes from mother's retrospective report. After that age they were observed and tested at 6-month intervals with supplementary reports from parents. Investigation was focused on four areas discussed below.
Findings: (a) Physical characteristics--Tom was consistently slightly heavier, broader build. The identicals remained within a pound of the same weight. Coloring and appearance was very similar for all three. Health was good. Motor development was in normal range, with Tom stronger and the identicals more agile throughout. (b) Habits and mannerisms--Tom's neonatal cry was lustier. His sleep pattern was consistently different from theirs. They fell asleep at once and woke first. He lay awake or played quietly before sleeping and slept longer. Tom was a persistent thumb sucker, the other two only occasional. In transient behavior the same similarity for Dick and Harry and difference for Tom was evident. For example at 18 months, given blocks, they used them the same way; Tom, very differently. (c) Intelligence--they were slightly above age level on the Gesell and the Vineland. Their IQ's on Stanford-Binet and Merrill-Palmer were close together and all rose about 11 points from approximately 106 to approximately 117 between ages 2 years and 4 years. Dick and Harry were only once more than two points apart.

Tom was consistently about four points higher. The speech development of the identicals was very much alike. Tom's vocabulary was a little larger but his speech less clear until 2 years. After that, development was about equal. Tom's reaction time in answering was a little slower. (d) Personality--in personality the triplets do not follow the above pattern. Up to 3 years, there seemed to be no stable personality characteristics. After that, distinct personalities began to emerge. Tom was most mature in that he felt responsible for caring for the others and had the longest attention span. Dick was gentle and sensitive. Harry was most labile emotionally and in play. He enjoyed teasing and sought adult attention. Several anecdotes and comments on a Rorschach test given at age 4 illustrate these traits.
Conclusions: None were drawn.

1.1.1.2 Rutter, M., Birch, H. G., Thomas, A., and Chess, S. Temperamental characteristics in infancy and the later development of behavioral disorders. British Journal of Psychiatry, 1964, 110, 651-666.

Problem: "Relating children's behavioral styles in early life to their later psychiatric referral for behavioral problems."
Hypothesis: "The temperamental characteristics of the two groups of children would differ and behavioral reactions of the child, identifiable at an early age, would be one set of determinants of the development of aberrant behavior at a later point in time. It was predicted that the clinical cases would be amodal to the group as a whole with respect to these characteristics." (Characteristics are stated below.)
Subjects: This is part of a longitudinal study of 128 children from early infancy on. The children come from preponderantly middle class Jewish professional families in greater New York. At the time of this particular study, the children ranged in ages from 1 through 6 years and 21 had been referred for psychiatric consultation.
Method: When joining the study, all parents were informed that psychiatric advice would be freely available should problems arise in connection with their children. At the time of the study, 21 parents had availed themselves of this opportunity. "The prime souce of data used [in this study] has been detailed narrative accounts by the parents of the child's behavior over time in his everyday life. Such accounts were obtained several times yearly." The protocols were categorized. The nine

characteristics rated were: regularity, adaptability, mood, intensity, approach/withdrawal, activity, threshold, persistence, and distractibility (the last two being omitted in this study). Scoring for any category was according to a three-point scale (e.g., for the category of regularity, the three points would be regular, variable, and irregular rhythms of functioning). Each category had a most frequently occurring or modal score position. Children were ranked according to the proportion of amodal responses in each category.

Results:

1. Are the behavioral characteristics of the children related to the occurrence of later psychiatric referral, irrespective of the clinical problem presented? The answer to this question was determined according to the mean rank the 21 clinical cases held in comparison to the total group on the seven characteristics.

   a. "No significant differences between the mean ranks of the 21 clinical cases and the other children were present" at age 1 year or on any characteristic.

   b. At age 2, "the clinical cases were differentiated by their having been more irregular ($p < .05$) more negative mood ($p < .02$) than the remainder of the children."

   c. "Differences were not significant in the third year, although it is apparent that the group became less adaptable." (No further elaboration or explanation for this statement was offered).

   d. "In the fourth year the clinical cases were much more intense ($p < .01$), less adaptable ($p < .02$), and exhibited more negative mood ($p < .01$) than the remainder of the children."

   e. At age 5, only the category of nonadaptability reached significance.

2. The clinical cases were broken down into two subgroups. Seventeen of them showed "some combination of temper tantrums or aggression together with habit disorder (sleeping or speech disturbances, encopresis, etc.). In some cases fears or mood disturbances were also prominent, other symptoms occurring less frequently." The remaining four children were referred with complaints of "lack of normal aggression and nonparticipation in play activities with other children." When the data for just the group of 17 were studied, it was evident that they were more amodal than when the total group of 21 was used.

a. In the first year, "the group was already somewhat amodal," although the differences were not significant.
b. In the second year "the differences regarding irregularity and negative mood were larger ($p < .02$), despite the fact that more of the children had had psychiatric referral by that age."
c. By age 4, significant differences existed for irregularity ($p < .01$), nonadaptability ($p < .01$), intensity ($p < .001$), and negative mood ($p < .05$).
d. At ages 3 and 5 no statistically significant differences existed, although the trends were in the same directions as those mentioned above.

3. The patterns of temperamental characteristics were studied. "The combination of irregularity, high intensity, unadaptability, and negative mood, had been previously noted as particularly likely to precede disorder. All children (whether or not presenting as clinical cases) who were in the upper half of the distribution on all of the four categories concurrently at each age period were noted. At all ages the proportion was greater among the clinical cases than among the remainder of the group. The differences were sizeable in the second year (35.3% compared with 8%), greater at 3 years (41.2% vs. 9.3%), maximal at 4 years (69.2% vs. 7.4%) and still large at 5 years."
4. A comparison between the clinical cases and their siblings included in the longitudinal study was made with five subjects. By this means the relevance of temperamental differences is tested within each group having a similar parental and home background." The comparison was made for the categories of mood, intensity, irregularity, and nonadaptability during years 1, 2, and 3. "In 10 out of 12 instances the clinical cases differ from their siblings in the predicted direction ($p < .055$)"; i.e., they were significantly more amodal. "In general, the siblings often deviated from the modal group in the same direction as the clinical cases, but to a lesser extent and with less consistency."
5. When a study was made of the four "nonparticipating" clinical cases, "no difference reached statistical significance."
6. The cases were examined for those whose symptoms appeared at an earlier (before age 3) vs. a later age (3-5 years). Twelve of the clinical cases had reached their fifth birthday at the time of the study. Three children had symptoms which began before their third birthday and were distinguished from the others "by an earlier peak year of amodality in each of the five categories" (irregularity, nonadaptability, withdrawal, intensity, negative mood). "This suggested that there was a positive relationship between the time when behavioral characteristics were most amodal and the time when the symptoms first appeared."

1.1.1.3 Rutter, M., Korn, S., and Birch, H. G. Genetic and environmental factors in the development of primary reaction patterns. British Journal of Social and Clinical Psychology, 1963, 2, 161-173.

Purpose: To explore the relative contributions of genetic and environmental factors to individual behavioral styles which appear early in infancy and persist. Behavior is seen as the result of interaction between factors. The study is part of a longitudinal study. A comparison is made of twins and sibs on the assumption that genetic factors will be distinguishable insofar as they influence behavior patterns in that monozygotic twins will be more alike that dizygotic twins, who will be indistinguishable from sibs. This will not hold for behaviors based on environmental factors. A second goal is to study stability of behavior and look for developmental factors which contribute to later behavior patterns.

Method: The subjects were eight pairs of twins and 26 pairs of sibs, all at least of chronological age (CA) 2. Source of data--narrative accounts by parents. Nine characteristics were considered: regularity, adaptability mood, intensity, approach/withdrawal, persistence, distractibility, activity, and threshold. Subjects were rated in each category on a three-point scale (roughly high, medium, low). Scores were computed from the ratings and a rank order found for each category. This was done at CA 1, 2, 3 for each subject. Comparisons could be made in rank differences between subjects and over time.

Findings: Mean rank differences within pairs of subjects at CA 1, 2, and 3 for seven categories were presented. For no category were all criteria of genetic influence met. Criteria were:

a. that monozygotic twins be more alike that dizygotic,
b. that dizygotic pairs be no more alike than sibs,
c. that no large differences be found within monozygotic pairs.

Evidence came closest to meeting above criteria for the categories "activity," "approach/withdrawal," and "adaptability." Evidence was stronger for all categories at CA 1 than for older ages. A dizygotic pair reared as identical showed a decreasing mean rank difference, whereas a monozygotic pair reared apart showed increasing difference with age. Instability over time is found, more so for some subjects than for others. Categories showing most genetic influence show most instability.

Conclusions: The findings are essentially negative for finding the effect of genetic factors on behavioral style. Some evidence is found for genetic influence, some for environmental influence. The interest of the study lies in differences between categories. Those which show most genetic influence are least stable over time. Nongenetic factors include pre- and paranatal factors (as

well as home environment) which may have differential effect on twins. The findings are consistent with those of other longitudinal studies. Consistency of functioning (stability) seems to be a persistent individual trait which should be considered in examining other traits. The authors conclude that heredity should not be opposed to environment in experimental design but that a process of continuous interaction between the organism and the environment should be seen.

1.1.6 PHYSIOLOGY, ETC.

1.1.6.1 Walker, R. N. Body building in young children: I. Body build and nursery school teachers' ratings. Society of Research in Child Development Monographs, 1962, 27, Number 3.

Purpose: The overall purpose is to investigate relationships between physique and behavior. This paper measures behavior by teachers' ratings. The theoretical background is Sheldon's somatotypes. It is hoped to test his hypotheses on young children. (They were worked out on a college age sample.)
Method: Subjects--125 nursery school children, 73 boys, 52 girls; chronological age (CA) 2-6 to 2-11, CA 3-6 to 3-11, CA 4-6 to 4-11. Procedures--(a) rating scale of 64 behavior items assembled from Sheldon and other sources; (b) physique ratings by three judges based on height, weight, standard pose nude photographs. Design--(a) subjects were rated independently by four or five teachers on behavior items; (b) height and weight measurements and photographs were taken; (c) these were rated independently by three judges on Sheldon's somatotypes: endomorphy, ectomorphy, mesomorphy; (d) tetrachoric correlations (tetra r) were computed between each behavior item and each physique item and compared to predictions based on Sheldon's theories. Product--moment correlations (r) were computed between each of nine behavior clusters and each physique item. Multiple correlations (R) were computed between each of nine behavior clusters and physique items correlated together. All correlations were done separately for boys and girls. Graphs were plotted to find patterns of clustering in scatter diagrams.
Findings: Tables show results of tetra r between behavior and physique. Endomorphy agrees least with predictions from Sheldon. Behavior traits associated with ectomorphy seem to be the reverse of those associated with mesomorphy. They agree substantially with Sheldon. A table shows r between behavior clusters and physique types. Only one cluster for each

sex (aggressiveness for boys, cooperativeness for girls) correlated significantly with endomorphy. Eight clusters out of nine had significant but not very high (around. 30) r with mesomorphy for boys. (Three out of nine, for girls). With ectomorphy two clusters were significantly related for each sex. Boys were unaggressive and cooperative. Girls were unsocial and uncheerful. Extreme physical groups showed the same traits with more striking results. R for boys was not much higher than r between traits and mesomorphy alone, because of high intercorrelation between physique items. For girls, many Rs were higher than rs for any physique item alone. For boys, energy, aggressiveness and sociability were significantly correlated with somatotype (not with any particular one, but with somatotype in general); for girls, energy, aggressiveness, and cheerfulness. Graphs (ingeniously constructed to show four dimensions)showed similar clusters. Ectomorphic boys tended to be high in sensitivity, socialness, and conformity, low in energy and aggressiveness. Girls were similar.

Conclusions: Endomorphy is least related to preschool age behavior variables; mesomorphy, most related (as rated by nursery school teachers). Ectomorphy tends to be the reverse of mesomorphy. The mesomorphic boys tends to be aggressive, assertive, energetic, self-confident, uncooperative. The picture is not so clear for girls. Age trends were inconclusive. The author concludes that associations do exist between physical type and behavior. He asks why. He suggests the relationship may be partly innate and partly learning about efficacy in use of the body and learning expectations and evaluations of behavior by others.

1.1.6.2 Walker, R. N. Body build and behavior in young children: II. Body build and parents' ratings. Child Development, 1963, 34, 1-23.

Purpose: This is the second in a series of studies relating body build to behavior according to Sheldon's somatotypes (Walker, 1962). In this paper behavior is measured by parents' ratings.

Method: Subjects--147 nursery school children, chronological age (CA) 2-6 to 2-11, 3-6 to 3-11, 4-6 to 4-11. (Mostly same subjects as in first study.) Procedures--(a) rating scale of 68 items (adjectives or phrases) assembled from various sources, different from teachers' rating sclae in first study; (b) physique ratings as in first study. Design--(a) predictions

were made for relation between each behavior item and each physique type according to Sheldon; (b) mothers rated own children on behavior items; (c) physique was rated as in first study; (d) predictions were compared with mother's ratings; (e) associations between behavior items and physique types were determined by X^2; (f) correlations were computed between eight behavior clusters--not statistically derived from those in first study--and each of the three physique types; (g) three physique types jointly were compared with the eight behavior clusters by multiple correlation and by graphs (scattergrams).

Findings: (Letters refer back to design categories.) (d) Two-thirds of predictions were confirmed in direction but very few at statistically significant levels--much lower than Sheldon's results, or than teachers' ratings in study I, except for endomorphy in girls which was better predicted than by teacher ratings. (e) Significant associations between behavior items and physique types were few for boys, many more for girls. Endomorphic girls (as predicted) were loving, cooperative, stable, cheerful; boys were quarrelsome, bossy, jealous (not predicted). Mesomorphs (boys and girls) were energetic. Ectomorphic girls were tense, unstable, uncooperative (not predicted); boys were similar but also affectionate and not aggressive (not predicted). (f) Correlations of behavior clusters with physical types for girls showed findings consistent with those above. There were few significant correlations for boys. Age trends were not striking. (g) Multiple correlations did not produce a striking difference from correlations with each physique type. Graphs showed some interesting patterns which suggest relationships (such as that ectomorphy and mesomorphy seem to relate to opposite behavior characteristics). Endomorphic boys fall into either the ectomorphic or mesomorphic pattern; but, except for those noted above, they do not have statistical confirmation.

Conclusions: Mothers' ratings show less relation to physique types than do teachers' ratings in the first study. Maybe mothers' ratings reveal their expectations, for example, endomorphic girls seem more acceptable to them than endomorphic boys; conversely, ectomorphic boys are more favorably reported than ectomorphic girls. Teachers' ratings did not reveal these attitudes. A possible cyclic effect is suggested: social adequacy gets mothers' approval, leading to more social adequacy. Three sources of relationship between physique and behavior are suggested: physical (organism), life experiences, and observers' reactions.

1.2
SENSORY-MOTOR PROCESSES

1.2.1 NORMATIVE

1.2.1.1 Gullickson, G. R. A note on children's selection of novel auditory stimuli. Journal of Experimental Child Psychology, 1966, 4, 158-162.

Purpose: Novelty has not been quantitatively described. If this were done, it would facilitate study of its effect on stimulus selection. The hypothesis in this study is that children familiarized to one auditory stimulus would prefer a second (novel) auditory stimulus.
Method: The number of subjects was 48; the chronological age was 4 years, 2 months to 5 years, 9 months. Vertical stimulus panel with light and horizontal response panel with lever which could be pushed or pulled was used. The control box for the experimenter has switches to control stimuli, an interval timer, counters activated by subject's movement of lever.
Design: Subject sat in front of panel. Experimenter showed him push and pull actions of the lever and instructed him to move it when light came on. Eighty-trial familiarization phase: subjects were divided into group 1, for whom push or pull responses of the lever activated stimulus A (two tones in scheme), and group 2, for whom push or pull responses activated stimulus B (pure tone). Test phase: push now activated A, pull B, or reverse. Subject was told he could move lever any way he wanted to. Type I and Type III ANOVA were used for analysis between subjects and between blocks for one subject.
Findings: When novel stimuli became available, there was significant preference for it. Subjects for whom stimulus A was novel continued to prefer it throughout the test trials. Those for whom B was novel no longer preferred it at the end of the test rials.
Conclusions: The hypothesis was confirmed. Both groups preferred the novel stimulus. Maybe A continued to be preferred longer because it was more complex.

1.2.1.2 Maccoby, E. E., and Bee, H. L. Some speculations concerning the lag between perceiving and performing. Child Development, 1965, 36, 367-377.

Purpose: It is observed that children can make perceptual discriminations before they can exhibit the same distinction

in behavior. The lag can be seen in speech perception and production and in drawing (form perception and production). Three hypotheses to account for this phenomenon are examined:

1. The child has two sets of cues, one for perceived, the other for produced speech, or he has one incomplete set. This is called the "idiosyncratic matching cue hypothesis" (from Metcalfe).

2. The child sees the stimulus figure as one possible view of a familiar object, draws the object, not the stimulus--"object constancy hypothesis."

3. To reproduce a figure, the child must know more attributes than he needs to recognize it--"number of attributes hypothesis."

One is treated empirically; two and three, theoretically; so they will be considered separately.

Hypothesis 1: Purpose: To test whether a child can distinguish between his own imperfect productions better than those of other children due to his idiosyncratic cues. Method: Subjects were 29 nursery school children selected from pool of 53, chronological age 2-11 to 5-1. Procedure and Design: Subjects were selected on the basis of their ability to discriminate between circles and triangles (tested by sorting task) but inability to produce discriminable (by adult judgment) drawings. Ten to thirty days after having made the drawings, subjects were asked to sort their own plus a random selection of other children's drawings to see if they could discriminate between circles and triangles better in their own drawings than in those of other children. The intended shape was known so correct sorting could be identified. Findings: Mean and standard deviation of correct identification of own and other's drawings were not significantly different. So poor drawers did not sort their own drawings more accurately than those of others. Conclusions re Hypothesis 1: The child is not known to have idiosyncratic cues for making perceptual discriminations.
Hypothesis 2: The child is thought to see form in terms of a known object which is then drawn; i.e., an ellipse is seen as a tipped circle; a diamond, as a skewed box. This is found to be an inadequate explanation of the observation that the most common error in the triangle task was to draw a square. It is suspected that the child sometimes knows he has made a poor copy, but doesn't know how to make a better one--this point needs investigation.

Hypothesis 3: Errors indicate that a child sometimes has some attributes of the figure but not all or that he has them, but not organized properly. This hypothesis still does not explain the error of square for triangle, since square has more sides and angles, which should make it more difficult in terms of number of attributes.

Overall conclusions: Hypothesis 3 is found to be imperfect but to account for the data on drawing more adequately than one and two. It also explains speech phenomena: due to the redundancy of language, a child can comprehend it without responding to all its attributes; but to produce it correctly, he must replicate all attributes. However, the error of saying "w" in "wight" when the word is perceived as "right" is not explained by hypothesis 3, since he has descriminated the same attribute he fails to produce. It appears that the modalities of speech and form production are not parallel in this aspect.

1.2.1.3 Sapir, S. G. Sex differences in perceptual motor development. Perceptual and Motor Skills, 1966, 22, 987-992.

Purpose: In the light of many findings of higher mortality and morbidity and of higher incidence of learning problems among boys than girls and, recently, of correlations between perceptual motor development and reading level, a hypothesis is proposed "that there are significant perceptual motor differences in 4-year-old boys and girls that tend to persist at the 5-year level" (page 988).

Method: There were 50 subjects, 16 boys and 34 girls. The chronological age was 4 years, 4 months to 5 years, 5 months at the first test, and 5 years, 1 month to 6 years, 2 months at retest. Mean age of girls was 1 month older.

Procedures: A test was constructed to distinguish developmental patterns in perceptual motor skills in 10 areas:

1. Visual discrimination (in geometric forms and words).
2. Visual memory (match and reproduce forms).
3. Auditory discrimination (pairs of words).
4. Auditory memory (number sequences, tapped rhythms).
5. Visual-motor (copy I cut).
6. Directionality/laterality (right-left orientation and eye, hand, foot dominance).
7. Orientation (relationships in time, size, space).
8. Visual-motor spatial relationships (copy designs, after White & Phillips, 1964).
9. Body image (draw figure, discriminate body parts).
10. Intelligence (vocabulary sub-test form L/M, Stanford-Binet).

Design: Test administered individually; first test in May before entering kindergarten; retest in January, 9 months later.

Findings: The hypothesis was confirmed. There was no significant difference in age of boys and girls. Test-retest moment correlations (r's) were: boys, r = .82; girls, r = .84 ($p < .01$). Mean change: boys, 9.6 from score of 47.1 to 56.7; girls, 6.6 from score of 60.0 to 66.6 (mean total scores), ($p < .001$). Boys gain more but are still behind. Among subtests, those which were significantly different and those significantly correlated were different subtests for boys than for girls. Mean scores on all subtests at both testings were higher for girls.
Conclusions: Perceptual motor functions are shown to improve in 9 months at this age. Those functions which change most rapidly are different for the two sexes. Girls are better in every area, but boys improve more. Visual-motor subtest correlates best with total score and distinguishes best between boys and girls. Since this ability is related to reading and writing, the difference may have implications for education. Intelligence may not be as good an indicator of reading readiness as perceptual motor development. These tests could be developed as predictors of academic success if they were used in a longitudinal study.

1.2.1.4 Zimny, G. H., and Weidenfeller, E. W. Effects of music upon galvanic skin response of children. Child Development, 1962, 33, 891-896.

Purpose: To test the hypothesis that children are emotionally affected by exciting and calming music as measured by galvanic skin response (GSR). The authors have previously studied this effect in college students, depressives and schizophrenics and found consistent positive GSR values for exciting music and negative values for calming music. They predict that results will be similar for children.
Method: Subjects--18 kindergarten, 18 third-grade, and 18 sixth-grade children.
Procedure: Music was chosen by the experimenters: portions of last movement of Dvoraks "New World Symphony" and Bach's "Air for the G string." Their judgment was checked by 59 college students who rated the pieces on a five-point exciting-calming scale. Comparison by Wilcoxin's test showed significant difference in expected direction. GSR was measured by a psychogalvanometer.
Design: Subjects were tested in an office in their school. Testing took 1/2 hour. Subjects were assigned randomly to AB or BA sequence of musical pieces. The three age groups were mingled in sequence of subjects to be tested. Duration of each piece of music was six minutes. GSR readings were taken four times a minute.
Results: Mean readings were computed for each subject for 2-minute intervals. From these, group means were obtained. The galvanometer recording was restricted by upper and lower bounds which

had been ample for adult subjects but produced a ceiling on measurement of children, because they turned out to be much more responsive. With one exception, the 2-minute measures were unaffected by the ceiling, and F and T tests were done. F tests showed no significant difference in variance. T tests showed significant differences of means for response to the two types of music; so the hypothesis of differential effects was confirmed. F, T and X^2 tests found no significant differences in response between age groups.
Conclusions: Differential effects of exciting and calming music on GSR were found. It was assumed that GSR is a physiological indicator of emotional response. The results were consistent with those from college students and psychotics, so there seems to be considerable generality of effect. The question is raised, would these effects be found in 6-month old infants? Compared with college students and psychotics, the children have a shorter latency and greater magnitude of response to exciting music. They show greater magnitude, but not shorter latency of response to calming music.

1.2.6 PHYSIOLOGY, ETC.

1.2.6.1 Brown, J. L. Differential hand usage in 3-year-old children. Journal of Genetic Psychology. 1962, 100, 167-178.

Purpose: To test the hypothesis that differential hand usage in young children is due, at least in part, to whether the activity engaged in is ego-syntonic. The term is not defined in the article. Two questions are posed:
1. Does grouping of activities by ego-syntonicity give as adequate a determination of dominance of grouping by frequency, motion or skill?
2. Do ego-syntonic activities show better defined dominance than nonego-syntonic activities?
Method: Subjects--10 children, chronological age 3.
Procedures: Subjects were observed for 20-minute periods in nursery school setting. Twenty-seven protocols were collected. They described all observed activity with emphasis on hand usage.
Design: Protocols were scored on each separable unit of activity. Each score was assigned to one of six exclusive content categories:
1. Description
2. Own body contact
3. Aggression
4. Social contact
5. Object contact
6. Miscellaneous

Scores were then coded for right or left hand (those for both hands were discarded), for movement/static, and for low, medium, or high skill. Chi-squares were calculated, on hypothesis of 50-50 handedness split.

Findings: Re first question. On determination on dominance.

a. Six subjects showed significant dominance on the basis of simple frequency of hand use.

b. Seven subjects showed significant dominance on movement.

c. Eight on skilled activity.

d. Eight on ego-syntonicity, measured by combining scores for "object contact" and "social contact." This was in a prior definition.

e. Nine were consistently dominant on all counts. Seven were right-handed, three left-handed.

Re second question. Five subjects used nondominant hand more frequently for nonego-syntonic activities. So the hypothesis was supported.

Conclusions: The hypothesis was supported by the findings. It was suggested that hand use as a measure of ego-syntonicity might be used as a clinical tool for investigation of personality dynamics.

1.2.6.2 Elliott, R. Physiological activity and performance: A comparison of kindergarten children and young adults. Psychological Monographs, 1962, 78, all.

Purpose: To study two relationships between physiological activity and performance in children which have been studied only in adults previously:

1. Between muscular and autonomic activity and perceptual-motor performance.

2. Between electrencephalogram phenomenon and motivation.

There is little theory and few data in the area, so no predictions were made.

Methods: Subjects--41 children, age 4 years, 9 months to 6 years, 6 months, with mean of 6 years (records of only 12 of these were analyzed) and 21 adults, age 17 to 38, with mean of 25.5 years.

Procedures: Physiological measures were electromyogram (EMG), electrencephalogram (EEG), heartrate (HR), respiration (PR), and palmar conductance (PC). Performance measure was reaction time (RT) given by key press response to auditory stimulus at approximately 4-second intervals. Incentives of money and toys were offered.

Design: Two sessions in laboratory about 10 days apart, 50 minutes each. First, to familiarize subject with setting, train him to asymtote on RT task. Second, session for data, presented in balanced incentive (I) and nonincentive (NI) blocks with

rest periods. Data analysis was complex: (1) RT, HR, RR, PC, EMG were each computed from samples of record in each experimental block, so they could be compared for three experimental conditions: Rest, NI, I. Body movement, an artifact on the records, was counted. Intraindividual concordance was found. Adaptation was measured; long-term between blocks.

Findings: (1) Interrelations among experimental conditions, physiological measures and RT: Incentive causes an increase in RT ($p < .001$) for both adults and children. Children made many more noninstrumental movements than adults. For adults there were significant relationships ($p < .02$) between incentive and every physiological variable; for children, only for HR and RR; and in these, adults were much more so. For adults HR and PC were significantly related ($p < .01$) to RT. For children RT was not related to any physiological variable. No relationship was found between physiological level and extremes of performance (best or worst) for either group. (2) Concordance: Intraindividual correlations are much lower for children than for adults. (3) Adaptation: Strong evidence of long-term adaptation was found for adults, none in any variable for children. Both showed short-term adaptation for PC. In RT, adults speeded up during one block; children slowed down. (4) Effect of interstimulus interval on RT: adults were significantly more affected by variations in interval than were children. (5) EEG findings: Slow frequencies are more dominant in children than in adults. Children show increasing amplitude with effort. Adults show decrease.

Conclusions: Age difference in relation between physiology and performance is due to children's lesser ability to maintain attention to the task. Physiological states and overt behavior are not causally related, but both are related to an antecedent condition, which is thought to be attention. Lower intraindividual concordance of physiological measures for children is explained also by lack of sustained attention. Children perceived multiple short tasks, where adults perceived one continued task. This conclusion also explains children's lack of long-term adaptation. Children's EEG responses to effort resemble those of adults aroused from drowsiness.

1.2.6.3 Kestenberg, J. S. The role of movement patterns in development: 1. Rhythm of movement. Psychoanalytic Quarterly, 1965, 34, 1-36.

Purpose: This is a study of classification of movement patterns. It is based on Freudian theory, within which bodily rhythmic patterns have been related to individual differences of temperament.

Method: There were three subjects. Procedures--longitudinal clinical study from birth to chronological age 10. Behavioral observations were made and tests (not specified) were given frequently in infancy, occasionally in childhood. Movement patterns were recorded; first, descriptively, later by freehand impressions of the flow of movement, last by Laban's test of adaptive motility in terms of oral, anal, and phallic rhythms.
Design: Predictions were made at chronological age 9 months of future personality. They are checked against followup data.
Findings: Subject 1 at 9 months was active; had short interval alternation between activity and rest; fast rhythm. Subject 2 showed irregular staccato activity; dysrhythmia. Subject 3 showed slow gradual rise of intensity to plateau; slow rhythm.
Predictions: Subject 1 (female) will develop strong penis envy, will alternate between initiative and giving up. Subject 2 (female) will become rigid and clutching, will cling to mother and hate her, will incorporate persistently. Subject 3 (male) will be placid, will hold onto masculinity determinedly despite periods of passive withdrawal, will turn toward father.
Outcomes: Subject 1 is energetic and tomboyish and becomes tense when she must sit still too long. Subject 2 shows tense clutching possessiveness with occasional periods of limp compliance to parents. She is perserverative in motor and verbal behavior. Subject 3 shows signs of neurosis; stuttering, tic, slow or absent responses. He did not move toward father. An unexpected finding was that subject 1 and subject 3 functioned better and were happier when free to use their own preferred rhythms.
Conclusions: Some specific predictions proved right; some, wrong; some, unproven. Individual rhythms were seen to persist. They were incorporated into complex patterns modified by inhibitions, adaptive controls. Further study of ego control of motility and its adaptation to communication is suggested.

1.2.6.4 Missiuro, W. Studies on developmental stages of children's reflex reactivity. Child Development, 1963, 34, 33-41.

Purpose: To investigate developmental features of reflex reactivity and motor behavior. The problem is seen in the light of the notion that the physical and emotional strain of education is different at different stages of development, for different sexes, and for different individuals. The effect of the presence of peers on motor behavior is what is actually being measured.
Method: There were 58 subjects, 32 male and 26 female. Chronological age (CA) 3 to 15.

Procedures: Ergographic recording of finger activity at 60 strokes a minute. Electromyographic recording of muscle tension in flexion of the upper arm.
Design: After practice session to learn task, each subject worked twice during one test day until he reached complete fatigue; first, in the presence of the experimenter only; then, with other children present.
Findings: More contralateral excitation when one muscle flexed in early childhood than in adulthood. Sight of peer stimulates curiosity, investigation, motor activity, but decrease in ergographic task work. Older children work better in presence of peers. Young child CA 3 or 4 stops work at first sign of fatigue. Older child, CA 6 or 8 and up, can continue work, despite growing fatigue. On electromyogram, peer presence was insignificant in increasing the maximum flexion of arm by preschool children; at CA 5 or 6 peer presence increased it by 61.7 microvolts. At CA 7 to 14 it increased by 151.8 microvolts. (No statement is made about significance of this result.)
Conclusions: These findings reflect early stages in process of becoming a social being. With this comes competitiveness. It is seen as being due to development of the neuromuscular system.

1.2.6.5 Muehl, S. Relation between word-recognition errors and hand-eye preference in preschool children. Journal of Educational Psychology, 1963, 54, 316-321.

Purpose: This is an investigation of visual orienting behavior as it related to hand and eye preference in prereaders. "Visual orienting behavior" in this context means a tendency to fixate on the left, right or middle part of a word.
Method: Subjects were 26 preschool children in two groups: age 3 years, 7 months to 4 years, 6 months and 4 years, 5 months to 5 years, 3 months.
Procedures: (1) Handedness test (from Updegraff); six items involving crayoning, cutting, hammering, throwing a ball, building blocks, spooning. (2) Eyedness test (from Hildreth); three items: sighting through a 3-centimeter hole at a photograph, walking to hole and sighting through, and sighting through Miles' V scope. (3) Word recognition task--a word is projected on a screen as a model. Below it, four scrambled versions are presented as response words. Response is a button press to indicate subject's choice of response word (e.g., girl: gilr, igrl, lirg; girl); "gilr" indicates a left-orienting response

and is scored as a left recognition error (lr error), "igrl" is scored right recognition error (rr error), "lirg" is scored middle recognition error (mr error).

Design: Subjects were given (1) an instruction-learning task, (2) a warm-up task, and (3) a 20-word test. Most subjects were given hand-eye preference tests at the same 20-30 minute session. Six comparisons of different hand-eye groups were made by Lindquist type VI ANOVA. Six comparisons of response choices were made for each of these hand-eye groups at each age group--i.e., correct response vs. left recognition error.

Findings: The findings are not fully presented for all comparisons. The following are given: correct responses were given significantly more often than any one kind of error. Differences between left, middle, and right errors were not significant. Proportion of correct responses increased with age relative to all errors, especially left recognition errors. Left-eyed, left-handed (LL) subjects made significantly more errors than RR subjects. Comparisons of RR subjects with all types of Left subjects, LR, RL, LL, showed similar results.

Conclusions: There was no tendency for left-eyed or -handed children to make consistently oriented errors but they did tend to make more errors overall than right-eyed and -handed subjects. With age, errors decrease which may indicate increasing ability to orient to the stimulus as a whole before responding. The sharp decrease in left recognition errors with age may show the influence of experience in left to right viewing. It may be that left-handed or -eyed children learn to orient more slowly and have diverse patterns of visual behavior so their errors are various. More boys than girls in this sample have some left sidedness. This may be related to boys' greater difficulty in learning to read.

1.3
GROWTH

1.3.8 GENERAL

1.3.8.1 Tanner, J. M. The regulation of human growth. Child Development, 1963, 34, 817-846.

Purpose: To explain the growth process. The author approaches the problem from a physiological point of view. He sees growth as target-seeking. The trajectory is genetically determined. The energy to make it actually happen comes from the environment. He is dealing with the heredity-environment question.
Contribution: The specific contribution is a hypothesis about the regulation of growth. He bases it on a study of catchup growth after a period of abnormal retardation due to illness or starvation. The hypothesis presents a time tally mechanism in the brain (possibly the hypothalamus) which represents the planned growth pattern in a structural way. The actual size of the organism is monitored by an inhibitor substance produced by the cells proportionately to their rate of growth. The velocity of growth is then controlled by the mismatch between the inhibitor and the time tally. The hypothesis is justified by comparing it with known events of catchup growth, chronic starvation, and precocious puberty.